

REMARKS

In the last Office Action, the Examiner withdrew claims 5-18 from further consideration as being directed to a non-elected species. The drawings were objected to because Fig. 7 is not designated with the legend "Prior Art". Claim 1 was objected to as containing informalities. Claims 2-4 and 19-21 were rejected under 35 U.S.C. §112, second paragraph for indefiniteness. Claims 1-4 and 19-22 were rejected under 35 U.S.C. §103(a) as being unpatentable over applicant's prior art disclosure in Fig. 7 ("APD") in view of U.S. Patent No. 5,917,569 to Tanuma et al. ("Tanuma").

In accordance with the present response, the specification has been suitably revised to correct informalities, provide antecedent basis for the claim language, and bring it into better conformance with U.S. practice. Original independent claim 1 has been amended to incorporate the subject matter of claim 2, which has been canceled, to further patentably distinguish from the prior art of record, and to overcome the objection and indefiniteness rejection raised by the Examiner. Claims 3 and 4 have been amended in view of the cancellation of claim 2 and to conform to the amendments to claim 1. Non-elected claims 11, 13-16, 18 and claims 19, 20 and 22 have also been amended to conform to the amendments to independent claim 1. New claims 23-30

have been added to provide a fuller scope of coverage. A new abstract which more clearly reflects the invention to which the amended and new claims are directed has been substituted for the original abstract.

Submitted herewith is a replacement sheet for Fig. 7 incorporating a revision to overcome the drawing objections. More specifically, Fig. 7 has been revised to insert the legend "Prior Art".

Non-elected claims 11, 13-16 and 18 and 29 have been retained in the application pending possible withdrawal of the restriction requirement or allowance of a generic or sub-generic claim. Applicant submits that claims 1, 3, 4, 19-20, 22-28 and 30 are generic to Species A and B identified by the Examiner in the December 10, 2004 Office Action, and it is applicant's understanding that the restriction requirement will be withdrawn upon the allowance of any one of these (or any other) generic claims.

In view of the foregoing, applicant respectfully submits that the objections to the drawings and claim 1 and the rejection of claims 2-4 and 19-21 under 35 U.S.C. §112, second paragraph, has been overcome and should be withdrawn.

Applicant respectfully requests consideration of his application in light of the following discussion.

Brief Summary of the Invention

The present invention is directed to a method for manufacturing a liquid display unit.

As described in the specification (pages 1-5), conventional methods for manufacturing liquid crystal display units have been complicated to carry out due to their complexity and low productivity. Additionally, the conventional manufacturing methods have often resulted in damage to a polymeric substrate of the manufactured liquid crystal display unit.

The present invention overcomes the drawbacks of the conventional art. Figs. 1-2 show an embodiment of a method for manufacturing a liquid crystal display unit according to the present invention embodied in the claims. In the manufacturing method, a roll of a flexible polymeric substrate 1 having a longitudinal length longer than a transversal width is provided. Transparent electrodes 2 and a vertical orientation film 3 are then formed on the flexible polymeric substrate 1. The vertical orientation film 3 is then solidified. A falling direction of liquid crystal molecules in the vertical orientation film 3 is then prescribed. Thereafter, the flexible polymeric substrate 1 is connected to an opposed flexible polymeric substrate 4 to define a gap therebetween. A liquid crystal 8 is then disposed in the gap between the flexible polymeric substrates 1, 4.

According to the present invention, the flexible polymeric substrate 1 is continuously fed from the roll in the longitudinal direction during the formation of the formation of the transparent electrodes 2 and the vertical orientation film 3, during solidification of the vertical orientation film 3, during prescription of the falling direction of liquid crystal molecules in the vertical orientation film 3, and during connection of the flexible polymeric substrates 1, 4.

By the foregoing manufacturing method according to the present invention, the liquid crystal display unit can be manufactured with a simple process by continuously feeding the flexible polymeric substrate from a roll, thereby increasing productivity and avoiding damage to the flexible polymeric substrate.

Traversal of Prior Art Rejection

Claims 1, 3, 4, 19, 20 and 22 were rejected under 35 U.S.C. §103(a) as being unpatentable over APD in view of Tanuma. Applicant respectfully traverses this rejection and submits that the combined teachings of APD and Tanuma do not disclose or suggest the subject matter recited in amended claims 1, 3, 4, 19, 20 and 22.

Amended independent claim 1 is directed a manufacturing method of a liquid crystal display unit. Claim 1 requires a first step of providing a roll of a flexible

polymeric substrate having a longitudinal length longer than a transversal width, a second step of forming transparent electrodes on the flexible polymeric substrate, a third step of forming a vertical orientation film on the flexible polymeric substrate, a fourth step of solidifying the vertical orientation film, a fifth step of prescribing a falling direction of liquid crystal molecules in the vertical orientation film, and a sixth step of connecting the flexible polymeric substrate to an opposed flexible polymeric substrate. Amended claim 1 further requires that the flexible polymeric substrate is continuously fed from the roll in the longitudinal direction during the second, third, fourth, fifth and sixth steps. No corresponding combination of steps is disclosed or suggested by the combined teachings of APD and Tanuma.

APD discloses a method of manufacturing a liquid crystal display unit including steps of forming a polymeric substrate and transparent electrodes, the formation and solidification of an orientation film, and an orientation step for liquid crystal molecules in the orientation film. However, as recognized by the Examiner, APD does not disclose or suggest the formation of an orientation film which is vertically aligned, as recited in claim 1. Likewise, APD clearly does not disclose or suggest that the polymeric

substrate is a flexible polymeric substrate that is continuously fed from a roll in the longitudinal direction during the second, third, fourth, fifth and sixth steps recited in amended claim 1.

The secondary reference to Tanuma discloses a process for forming a vertical orientation film by moving a substrate. More specifically, as shown in Figs. 12(a)-(c) of Tanuma, an alignment film is rubbed using a rubbing roll 21 while the substrate 11 is moved relative to the rubbing roll via a stage 22. However, Tanuma does not disclose or suggest that the substrate 11 is a flexible polymeric substrate that is continuously fed from a roll in the longitudinal direction during the second, third, fourth, fifth and sixth steps recited in amended claim 1. Since Tanuma does not disclose or suggest these features, it does not cure the deficiencies of APD. Accordingly, one ordinarily skilled in the art would not have been led to modify the references to attain the claimed subject matter.

Claims 3, 4, 19, 20 and 22 depend on and contain all of the limitations of amended independent claim 1 and, therefore, distinguish from the references at least in the same manner as claim 1.

In view of the foregoing, applicant respectfully requests that the rejection of claims 1, 3, 4, 19, 20 and 22

under 35 U.S.C. §103(a) as being unpatentable over APD in view of Tanuma be withdrawn.

Applicant respectfully submits that new claims 23-30 also patentably distinguish from the prior art of record.

New independent claim 23 is directed to a manufacturing method of a liquid crystal display unit and requires the steps of providing a roll of a flexible polymeric substrate having transparent electrodes and a longitudinal length longer than a transversal width, and continuously feeding the flexible polymeric substrate from the roll in the longitudinal direction while sequentially forming a vertical orientation film on the flexible polymeric substrate, solidifying the vertical orientation film, and prescribing a falling direction of liquid crystal molecules in the vertical orientation film. No corresponding combination of steps is disclosed or suggested by the prior art of record as set forth above for amended independent claim 1.

New independent claim 26 is also directed to a manufacturing method of a liquid crystal display unit and requires the steps of providing first and second rolls of respective first and second flexible polymeric substrates each having a longitudinal length longer than a transversal width, continuously feeding the first flexible polymeric substrate from the first roll in the longitudinal direction while

sequentially forming transparent electrodes on the first flexible polymeric substrate, forming a vertical orientation film on the first polymeric substrate, solidifying the vertical orientation film, and prescribing a falling direction of liquid crystal molecules in the vertical orientation film, continuously feeding the second flexible polymeric substrate from the second roll in the longitudinal direction while sequentially forming transparent electrodes on the second flexible polymeric substrate, forming a vertical orientation film on the second polymeric substrate, solidifying the vertical orientation film formed on the second polymeric substrate, and prescribing a falling direction of liquid crystal molecules in the vertical orientation film formed on the second polymeric substrate, arranging the first and second flexible polymeric substrates opposite one another to define a gap therebetween, and disposing a liquid crystal having a negative dielectric anisotropy in the gap between the first and second flexible polymeric substrates. Again, no corresponding combination of steps is disclosed or suggested by the prior art of record as set forth above for amended independent claim 1.

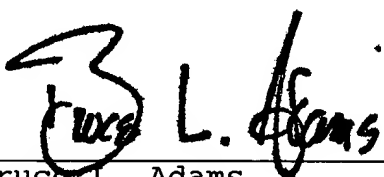
Claims 24-25 and 27-30 depend on and contain all of the limitations of independent claims 23 and 26, respectively, and, therefore, distinguish from the prior art of record at least in the same manner as claims 23 and 26.

In view of the foregoing amendments and discussion,
the application is believed to be in allowable form.
Accordingly, favorable reconsideration and allowance of the
claims are most respectfully requested.

Respectfully submitted,

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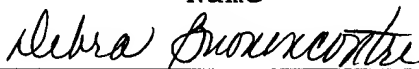
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JUNE 20, 2005

Date

IN THE DRAWINGS:

Submitted herewith is a replacement sheet for Fig. 7 incorporating a revision to overcome the drawing objection. More specifically, Fig. 7 has been revised to insert the legend "Prior Art."